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ABSTRACT

An investigation was conducted to examine a particular aspect of the following questions: (1) What, if anything, do kindergartners do when presented with a set of pictures that might serve to facilitate their retention of pictorial stimuli? (2) What might they be capable of doing in the context of a recognition test that they might not be able to do as effectively in the context of a free recall test? A total of 72 kindergarten-age children participated; half were assigned to the look instruction condition, half to the remember instruction condition. Two response measures figured in the assessment of each S's storage and retrieval activities: (1) the incidence of overt labelling, and (2) the number of correctly remembered stimuli in each of three retention tests. A three-way analysis of variance was performed on the retention test data. Retention test data revealed an apparent hierarchy of retention test scores, with scores in the visual recognition test superior to those in the auditory recognition test, and scores in the auditory recognition test superior to those in the free recall test. Additional results are given. (CK)

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Looking versus Remembering: A Comparison of the Mediational Activity of Kindergarten Children in Three Retention Tasks[1]

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In recent years, several studies of memory development have found that kindergarten-age children (i.e., five- and six-year-olds) generally remember fewer experimental stimuli (e.g., words, pictures, or objects) than older children in recall- and recognition-type tasks (Hall, 1968; Horowitz, 1969; Horowitz & Horowitz, 1973; Moely, Olson, Halwes, & Flavell, 1969; Nelson, 1969).

And yet, kindergarteners do remember. In fact they are quite proficient at recognizing pictures that they have seen before. In one recent study (Horowitz & Horowitz, 1973), for example, kindergarten-age children were instructed to try and remember 12 pictorial stimuli, and subsequently tested for their retention by either a free recall or visual recognition procedure. Their retention test scores proved most interesting. they recognized an average of 10.5 of the original 12 stimuli from a recognition display which included 24 other pictures, while recalling an average of only 5.8 of the original 12 stimuli. In short, these kindergarteners were able to recognize almost twice as many of the original stimuli as they were able to recall. This difference in performance and, more importantly, the high recognition scores raise two major questions concerning the mnemonic capabilities of kindergarten-age children. First, what, if anything, do kindergarteners do when presented with a set of pictures that might serve to facilitate their retention of such stimuli? And second, what might kindergarteners be capable of

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doing in the context of a recognition test that they might not be able to do as effectively in the context of a free recall test?

The present investigation was designed to probe a particular aspect of each of these questions. To begin with, an effort was made to assess the possible mediational value of "looking"--a relatively unsophisticated activity, but nonetheless, one that might serve to facilitate the kindergartener's retention of pictorial stimuli. This was done by instructing one group of kindergarten-age subjects simply to look at a series of line-drawn pictures, and then comparing their scores on a subsequent retention test to those of a second group of kindergarteners who had previously been instructed to try and remember the same series of pictures. In this way, the effects of "looking" could be compared with the effects of "trying to remember," or whatever it is that kindergarteners do when asked to remember a set of pictures. An effort was also made to study the kindergartener's ability to retrieve from memory information about a set of previously presented pictures. This was done by presenting the same set of pictorial stimuli to subjects in both the "look" and "remember" instruction groups, and subsequently comparing their retrieval of stored information in the context of three different tests of retention: a free recall test, a visual recognition test, and an auditory recognition test. It was hoped that such a comparison would enable us to assess something of the nature and extent of the kindergartener's retrieval capabilities.

Method

An overview of the experimental design is presented in Table 1. Seventy-two kindergarten-age children participated in this investigation (mean CA 6 years-1 month); half were assigned to the look instruction condition, half to the remember instruction condition. Twelve subjects in each condition were then assigned to one of the study's three retention tests: either the visual recognition test, the auditory recognition test, or the free recall test. An equal number of male and female subjects participated in each of the six Instruction x Retention test groups.

The experimental procedure consisted of three phases, an instruction phase, a presentation phase, and a test phase. In the instruction phase, subjects were told that they would see a series of 12 pictures. They were then given their respective look or remember instructions. Next, during the presentation phase, the same 12 pictorial stimuli were presented in the same random order to each subject. These stimuli consisted of single line drawings of common objects (e.g., a tree, a car, a shoe, etc.), and each was presented for 3 seconds. After the last stimulus was presented, subjects were then tested for their retention of these stimuli in one of three ways--by a free recall procedure, by a visual recognition procedure, or by an auditory recognition procedure. In the free recall procedure, subjects were asked to tell the experimenter the names of as many of the previously presented pictures as they could remember. In the visual recognition test, subjects were asked to tell the experimenter which of 36 successively presented pictures they could remember having just seen. Here, the original 12 stimuli were randomly dispersed among 24 other line-drawn objects. And finally, subjects tested in the auditory recognition procedure were asked to tell the experimenter which of 36 named objects they could remember having just seen in the preceding set of pictures. The 24 new objects named in this recognition procedure were the same as those pictured in the visual recognition test, and the same test order was maintained in both the auditory and visual recognition test procedures.

Results

Two response measures figured in the present assessment of the kindergartener's storage and retrieval activities: first, the incidence of overt labelling or the naming aloud of pictorial stimuli during the presentation phase, and second, the number of correctly remembered stimuli in each of the three retention tests. A summary of the data gathered by each of these measures is presented in Tables 2 and 3. Looking at the retention test data first, we see that Table 2 presents

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Insert Tables 2 and 3 here

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the mean number of pictorial stimuli that were correctly remembered by kindergarteners in each of the six Instruction x Retention test groups. The various standard deviations are also presented. A three-way analysis of variance (Instruction Condition x Retention Test x Sex) was performed on the retention test data. This analysis revealed that only the Retention Test differences were significant (F (2,60) = 173.74, $p < .01$). No significant differences were found between the performance scores displayed by kindergarteners in the "look" and "remember" instruction conditions; nor were there any significant sex differences or interactional effects.

We then made several post hoc comparisons of the retention test data and found that overall, performance scores in both the visual and auditory recognition tests were superior to those in free recall test (t (46) = 19.17, $p < .005$ for the visual recognition-free recall comparison; t (46) = 14.08, $p < .005$ for the auditory recognition-free recall comparison). Scores in the visual recognition test were also found to be significantly better than those in the auditory recognition test (t (46) = 2.36, $p < .05$), although this difference was less pronounced than those found between the recall and recognition tests.

In summary then, the retention test data revealed an apparent hierarchy of retention test scores, with scores in the visual recognition test superior to those in the auditory recognition test, and scores in the auditory recognition test, in turn, superior to those in the free recall test. These differences were reflected in the test scores of Ss in both the look and remember instruction conditions, with but one exception: the scores of Ss in the remember condition did not differ significantly in the visual and auditory recognition tests.

Finally, a comparison was made of the number of subjects in each instruction condition who overtly labelled the 12 pictorial stimuli during their initial presentation. These data are presented in Table 3. A chi-square analysis indicated that the proportion of overt labellers in the remember condition was significantly greater than the proportion of labellers in the look condition ($X^2 = 4.34$, $p < .05$). Thus, significantly more kindergarteners were found to overtly label the pictorial stimuli

following the remember instructions than following the look instructions. This activity, however, did not have a differential effect upon the retention scores of those who labelled, for no significant differences were found between the scores of labellers and non-labellers in any of the three retention tests (t's (10)<1.6).

Discussion

Now, what can we infer from these results about the storage activities and retrieval capabilities of the kindergarten-age child? To begin with, the high scores displayed by subjects in the visual recognition test seem to indicate that kindergarteners apparently store quite a bit of information about the various task stimuli. They do not seem to be production deficient in an absolute sense, perhaps only in a developmental sense, that is, in relation to the more sophisticated mnemonic-mediational activities which tend to characterize the memory task performances of older children.

The superiority of scores in the visual recognition test may also indicate that stimulus information is stored largely in some pictorial or iconic form, a form which the kindergartener could then easily match-up with the original stimuli as they appear again during the visual recognition test procedure. If this is the case, then perhaps the somewhat lower scores found in the auditory recognition test suggest that kindergarteners may have had some difficulty in matching up elements of their own iconic storage with the verbal equivalents of the original stimuli. Perhaps some of the information in their iconic storage does not avail itself to translation from iconic to verbal form, or if translated, may still not be in the particular form required for correct recognition of the stimulus names presented during the auditory recognition procedure. In any case, our kindergarteners still managed to perform reasonably well in the auditory recognition test procedure.

When it came to free recall, however, our kindergarteners left much to be desired. Their retention test scores in this procedure were considerably lower than the scores of their classmates in the two recognition procedures. This we

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suspect reflects an inability on the part of kindergarteners to generate their own cues for the systematic search and recovery of stored information. In short, we would argue that kindergarteners are really production deficient when it comes to the retrieval of stored information in the free recall task.

Our results have also indicated that there were no significant differences between the retention test scores displayed by kindergarteners in the "look" and "remember" instruction conditions. This similarity of scores, despite quite different instructions, suggests that deliberate, stimulus-directed looking may be part of an effective mediational activity for at least the short-term retention of information about pictorial stimuli. We suspect, however, that for many of our kindergarteners close scrutiny of the task stimuli was probably accompanied by some act of stimulus identification.

We then wondered about the task activities of kindergarteners in the remember instruction condition. How many of these subjects had engaged in anything more than that which we required of subjects in the look condition? It is just possible that the similarity of retention scores in the two instruction conditions may have resulted from a similarity in the task activities of participating subjects. This view is consistent with that of Flavell and his associates (Appel, Cooper, McCarrell, Sims-Knight, Yussen, & Flavell, 1972) who, in their recent developmental study of the distinction between perceiving and remembering, argue that preschoolers (4-6 year-olds) seem unable to differentiate between remembering a set of pictures and simply looking at such pictures, and may, in fact, even fail to understand the "concept of remembering." With regard to the present subjects, however, we believe that most of them were able to comprehend our remember instructions, even though some may have engaged in nothing more intentional than stimulus-directed looking. In this respect, looking and its related activities may still be the prime mediational activities of the kindergarten-age child, at least when it comes to remembering pictorial events.

In addition to looking, some of our kindergarteners in the remember condition also labelled each of the stimuli during presentation. This we suspect is a rudimentary form of what later will become more effective verbal encoding and verbal rehearsal. And finally, we believe that the serial position data presented in Figure 1 also suggest that kindergarteners in our remember condition engaged in different activities than their classmates in the look condition. As portrayed in Figure 1, "required looking" seems to have had its greatest effect upon the recall

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Insert Figure 1 here

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of those stimuli that appeared during the latter part of the presentation series, whereas the various "remembering" activities seem to have enhanced the frequency with which various stimuli throughout the series were recalled. These bits of evidence suggest that kindergarteners may take a more active role in working with stimulus input than one might expect, and for this reason, we are continuing our efforts to study the activities of the kindergarten-age child in a variety of memory task situations.

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Table 1

Overview of Experimental Design (n=72)

Instruction Condition	Type of Retention Test		
	Visual Recognition	Auditory Recognition	Free Recall
Look	6 male Ss 6 female Ss	6 male Ss 6 female Ss	6 male Ss 6 female Ss
Remember	6 male Ss 6 female Ss	6 male Ss 6 female Ss	6 male Ss 6 female Ss

Table 2

Mean Retention Scores of Kindergarteners in the Visual Recognition, Auditory Recognition, and Free Recall Tests following the "Look" and "Remember" Instructions

Instruction Condition	Type of Retention Test					
	Visual Recognition		Auditory Recognition		Free Recall	
	Mean Score	S.D.	Mean Score	S.D.	Mean Score	S.D.
Look	10.92	1.06	9.83	.99	4.75	1.30
Remember	11.00	.91	10.50	1.55	5.00	1.08

Table 3

Number of Overt Labelers and Non-labelers in each Instruction Condition

Instruction Condition	Overt Labelers	Non-labelers
Look	3	33
Remember	11	25

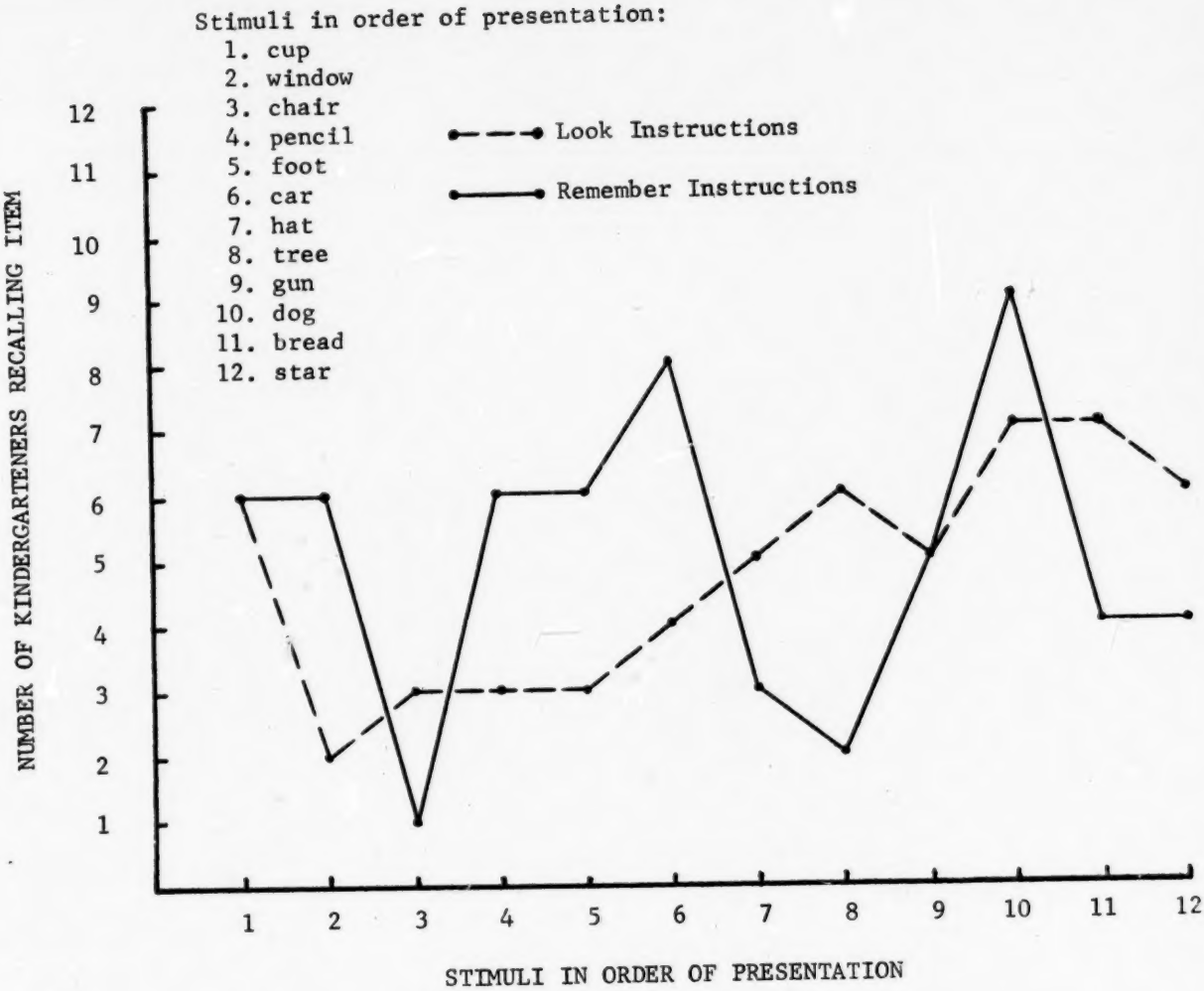

Figure 1. Frequency of recall for each stimulus in the two instruction conditions.